

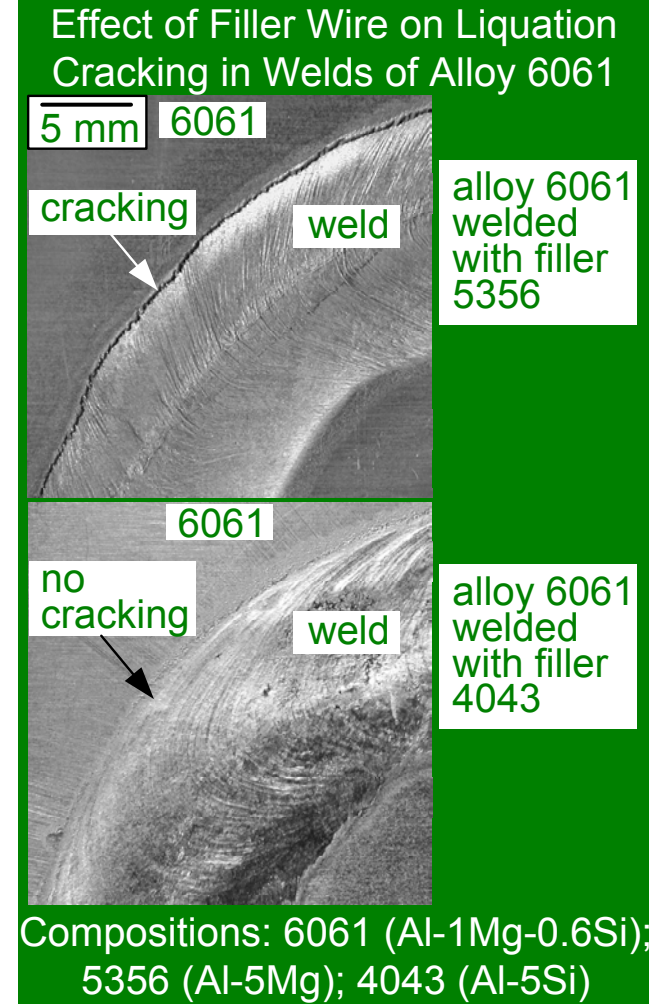
Partially Melted Zone (PMZ) Cracking in Aluminum Welds

Sindo Kou, University of Wisconsin, DMR-0098776

Condition for PMZ cracking (liquation cracking):

- PMZ is immediately outside the weld, where grain boundary melting occurs during welding. For cracking to occur, the solidifying and contracting weld metal pulling the solidifying PMZ must be higher in strength than the PMZ. The strength of a solidifying material is dominated by the fraction solid, which can be easily calculated.
- Aluminum alloys, widely used in transportation industries, are susceptible to PMZ cracking in welding.

1. S. Kou, "Solidification and Liquation Cracking Issues in Welding," JOM, invited review article, June 2003, pp. 37-42.
2. C. Huang, and S. Kou, "Liquation Cracking in Full-Penetration Al-Mg-Si Welds," Welding Journal, in press.
3. C. Huang, and S. Kou, "Liquation Cracking in Partial-Penetration Aluminum Welds: Effect of Penetration Oscillation and Backfilling," Welding Journal, vol. 82, 2003, pp.184s-194s.



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TECH SPOTLIGHT

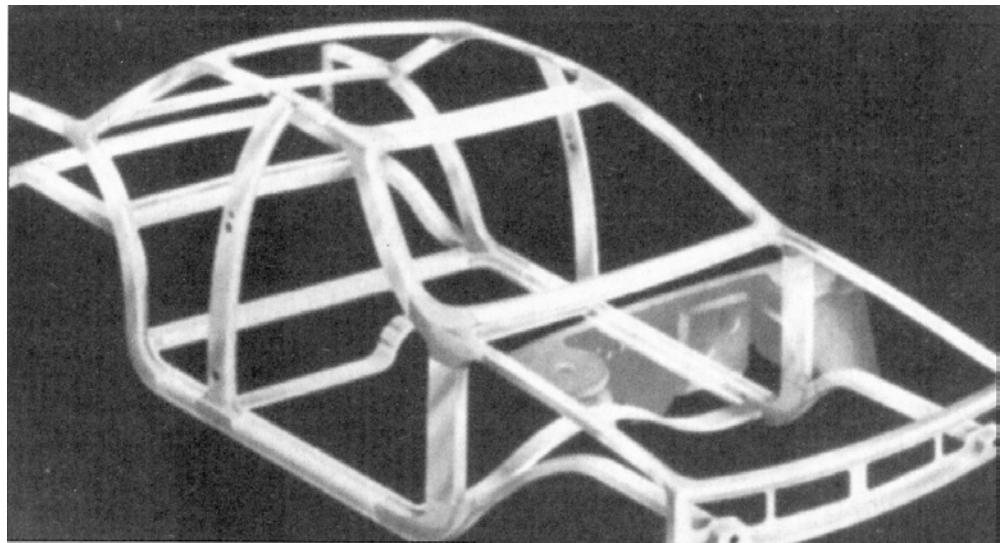
Arc welding automotive aluminum

Education:

- 2 graduate students (C. Huang and G. Cao) have participated in research.

Outreach:

- Communicated with Miller Electric Manufacturing Company, Appleton, WI, 2002 (biggest welding equipment manufacturer in US), ALCOA, and General Motors.



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